A RECIPROCATING SAW

Related Applications

[0001] This application claims priority to China Application No. 02258628.8 filed November 18, 2002.

Technical Field

[0002] The present invention relates to a reciprocating saw.

Background of the Invention

[0003] A known reciprocating saw comprises a housing, a plunger in the housing for mounting a saw blade, a driving gear connected to a driving mechanism, a first eccentric shaft and a second eccentric shaft disposed on the driving gear, a link member whose rear end portion connects to the first eccentric shaft, a pushing member whose rear end portion rotatably connects to the second eccentric shaft and a lifting member pivotally connected to the housing. A front end portion of the link member is rotatably connected to a rear end portion of the plunger so that the first eccentric shaft drives the link member to move reciprocally so that the plunger is able to drive a saw blade fore and aft when the driving gear rotates. For energy saving purposes, the saw blade is desirably in a downwardly depressed state relative to the workpiece when the saw blade moves in a direction against the teeth and the saw blade is desirably in a slightly upwardly lifted state relative to the workpiece when the saw blade moves in the opposite direction. For obtaining such a desirable state, a blade orbital lifting device is supplied. An actuating member for the blade lifting device in the conventional design actuates the blade lifting device by pulling. In this type of structure, the direction of movement of the actuating member is consistent with the direction of movement of the plunger so that acute vibrations occur during use.

Summary of the Invention

[0004] In an embodiment, the present invention is a reciprocating saw comprising a housing for a plunger upon which is mounted a saw blade. A driving gear is connected to a driving mechanism. A first eccentric shaft and a second eccentric shaft are disposed on the driving gear. A rear end portion of a link member connects to the first eccentric shaft. A rear end portion of a pushing member is rotatably connected to the second eccentric shaft. A front end portion of the link member is rotatably connected to a rear end portion of the plunger. A lifting member is pivotally connected to the housing and contacts a front end portion of the pushing member and a sleeve bearing disposed on a rear end portion of the plunger. An angle formed between lines through the central axis of a first eccentric shaft, the central axis of the driving gear and the central axis of the second eccentric shaft is an obtuse angle, wherein the lines lie in a plane perpendicular to the first eccentric shaft.

[0005] Additional aspects and advantages of this invention will be apparent from the following detailed description of preferred embodiments, which proceeds with reference to the accompanying drawings.

Brief Description of the Drawings

[0006] The accompanying drawings which are incorporated in and constitute a part of this specification illustrate an embodiment of the present invention and together with the description serve to explain the principles of the present invention in a non-limitative sense.

[0007] FIG. 1 shows a mainly sectional view of an embodiment of the invention;

[0008] FIG. 2 shows a sectional view along line A-A of FIG. 1;

[0009] FIG. 3 shows a sectional view along line B-B of FIG. 1;

[0010] FIG. 4 shows a perspective view of the lifting member of Figure 1; and

[0011] FIG. 5 shows a perspective view of the sleeve bearing of Figure 1.

Detailed Description of Preferred Embodiments

[0012] In Figures 1 and 2, a reciprocating saw comprises a housing [13] within which is a plunger [15] for exteriorly mounting a saw blade [1]. A driving gear [7] is connected to a driving mechanism and a first eccentric shaft [5] and a second eccentric shaft [8] are disposed respectively on the top surface and the bottom surface of the driving gear [7]. A link member [4] comprises twin plates [4a, 4b] fastened together and diverging at their rear end into twin arms [4c, 4d] and at their front end into twin arms [4e, 4f]. The ends of the twin arms [4c, 4d] include an

aperture which pivotally engages with pins [21a, 21b] on the outer face of a coupling [21] mounted on a bearing on the first eccentric shaft [5]. The ends of the twin arms [4e, 4f] include an aperture which pivotally engages with pins [22a, 22b] on the outer face of a coupling [22]. The coupling itself is pivotally mounted on a vertical pin [10]. The vertical pin [10] extends through and beyond the walls of the plunger [15] where it is riveted at its ends to the coupling [22]. A rear end portion of a pushing member [9] is rotatably connected to the second eccentric shaft [8].

[0013] A lifting member [11] is pivotally connected to the housing [13] via a horizontal pivot [3]. A lower rear end portion of the lifting member [11] contacts a front end portion of the pushing member [9] and an upper front end portion of the lifting member [11] bears against a radial connecting pin [16] on a sleeve bearing [12] which is disposed on the rear end portion of the plunger [15]. A spring [2] is mounted between the housing [13] and the sleeve bearing [12] and generally serves to bias the lifting member [11] against the pushing member [9].

[0014] When pushed forward by the rotation of the driving gear [7], the front end portion of the pushing member [9] pushes the lifting member [11] causing it to rotate about the pivot [3] in the clockwise direction so that the lifting member [11] lifts the sleeve bearing [12] upward to bring a rear end portion of the plunger [15] upward. At the same time the spring [2] is depressed. The upward movement of the rear end portion of the plunger [15] causes the plunger [15] to swing about a ball bearing [14] so that the saw blade [1] synchronously moves down. The downward movement assists the forward cutting action of the saw blade [1].

[0015] During the return action of the saw blade [1], the lifting member [11] rotates about the pivot [3] in the anticlockwise direction. The rear end portion of the plunger [15] moves down so that the plunger [15] swings about the ball bearing [14] in the clockwise direction assisted by the restoring force of the depressed spring [2]. The saw blade [1] lifts upwardly away from the workpiece thereby reducing the friction between the saw blade [1] and the workpiece to save energy. A small counterweight [6] seated on the upper part of the driving gear [7] serves to reduce further vibrations resulting from the reciprocative action of the plunger [15].

[0016] As illustrated in Fig 3, an angle formed between lines through the central axis of the first eccentric shaft [5], the central axis of the driving gear [7] and the central axis of the second eccentric shaft [8] is obtuse. The lines lie in a plane which is perpendicular to the first eccentric shaft [5]. In other words, if the plane is divided

into four quadrants (I, II, III and IV) by the central axis of the driving gear shaft [17], the central axis of the first eccentric shaft [5] and the central axis of the second eccentric shaft [8] do not lie in the same quadrant.

[0017] It will be obvious to those having skill in the art that many changes may be made to the details of the above-described embodiments without departing from the underlying principles of the invention. The scope of the present invention should, therefore, be determined only by the following claims.